WAR FOOD ADMINISTRATION
Office of Marketing Services
Washington 25, D. C.

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To: All Field Offices of Grain Products Branch

From: Lawrence Zeleny, Chief, Standardization Research and Testing Division,
Grain Products Branch

Subject: Testing Flour for Enrichment

Enriched flour is tested by the Grain Products Branch to determine in part whether it meets the requirements of the standards of identity for enriched flour promulgated by the Federal Food and Drug Administration. A new quick test by which it is possible to determine easily and quickly whether flour is fully enriched, partially enriched, or unenriched has been developed by the Beltsville laboratory of the Branch. This method can be employed by the field office and is described in detail in the attached mimeographed article.

Equipment

A few of the field offices of the Branch issuing certificates on enriched flour will be furnished the simple equipment necessary for making the quick enrichment test. If this trial proves to be successful other offices issuing certificates on enriched flour will be supplied the necessary equipment. Such offices will receive by express a wooden box containing the following equipment:

(1) One "saddle bag" bottle containing about 1 ounce of a 4 percent solution of aniline in alcohol (enrichment test solution A). Poison!

(2) One "saddle bag" bottle containing about 1 ounce of a 4 percent solution of cyanogen bromide (enrichment test solution B). Poison! The fumes from this solution are also poisonous and act as a "tear gas."

(3) Two dropping bottles to be used for dispensing solutions A and B.

(4) One porcelain test plate.

(5) One spatula.

(6) One sample of enriched flour to be used as a standard.

(7) One sample of unenriched flour to be used as a standard.

As soon as this equipment is unpacked transfer solutions A and B from the "saddle bag" bottles in which they are shipped to the dropping bottles which will be properly labeled before shipment. This transfer should be made in a well-ventilated room since fumes from solution B are extremely poisonous and also act as a "tear" gas. The glass stoppers of the dropping bottles should be seated tightly and except when the solutions are being used, the stoppers should be turned so that the spouts are at right angles to the projections on the necks of the bottles. When a dropping bottle is used to dispense its solution, turn the stopper so that the spout is in line with one of the projections on the neck of the bottle, but turn the stopper again at right angles immediately after use. The stoppers of the dropping bottles have been treated with a lubricant which should not be removed.

Rinse empty saddle bag bottles thoroughly and return to Beltsville carefully packed.

Keep solutions in the dropping bottles in a dark place when not actually in use and keep them as cool as possible (without freezing). Do not expose them to direct sunlight.

Procedure

CAUTION. BOTH SOLUTION A (ANILINE) AND SOLUTION B (CYANOGEN BROMIDE) ARE HIGHLY TOXIC. USE THEM WITH CARE. TO AVOID TOXIC FUMES USE THEM ONLY IN A WELL-VENTILATED ROOM. AVOID CONTACT OF THE SOLUTIONS WITH THE SKIN, BUT IF SUCH CONTACT ACCIDENTALLY OCCURS WASH THE AFFECTED PARTS IMMEDIATELY WITH A LARGE VOLUME OF WATER. DISPOSE OF FLOUR TREATED WITH THE SOLUTIONS IN SUCH A MANNER THAT IT CANNOT POSSIBLY CONTAMINATE EITHER FOOD OR ANIMAL FEED.

Using the reagents and simple equipment listed above, field offices to which the equipment is being sent and that are having enriched flour tested for other factors by a commercial laboratory are requested to test each car of flour for enrichment in accordance with the following procedure:

(1) Place approximately 0.7 grams of the flour to be tested in one of the wells of the porcelain test plate and press the flour to a smooth flat surface with the spatula, exerting, as nearly as possible, the same amount of pressure on all samples. It is not necessary to weigh this portion of flour. Remove all traces of flour from the spatula before using it for the next sample.

(2) Drop 2 drops of solution A onto the center of the surface of the flattened flour producing a wetted area about 1/4 inch in diameter.

(3) Drop onto the center of the wetted area 3 drops of solution B.

Until the operator has become familiar with the colors developed in the test the above procedure should be carried out with the standard samples of enriched and unenriched flour simultaneously with the flour samples under test.

Interpretation and Use of Results

Fully enriched flour will develop almost instantly a canary yellow color on the surface where the reagents have been dropped. Unenriched flour will develop essentially no color until after 10 or 15 minutes. All color comparisons with standard enriched or unenriched flour should be made exactly 4 minutes after the addition of the reagents. Depending on the outcome of the quick enrichment test, the following action should be taken:

(1) Flour that develops a color essentially the same as that developed by the standard sample of enriched flour is considered to be properly enriched for the purpose of certification. Detailed enrichment tests will continue to be made at Beltsville of routine supervision samples in order to detect mills that fail by a small margin to enrich flour properly. (See our memorandum of January 24, 1944, on this subject.)

(2) Flour that, like the standard sample of unenriched flour, develops essentially no color within 4 minutes after the addition of the reagents, or flour that develops a color only slightly greater than that developed by the standard unenriched flour but very much less than that developed by the standard enriched flour should, after tests for protein, ash, moisture, etc., have been completed, be certificated as failing to meet contract specifications "account not adequately enriched." Samples of such flour should be submitted to Beltsvill by regular mail for confirmatory tests, but certificates should not be withheld pending the outcome of such tests.

(3) Submit to Beltsville for precise enrichment testing samples of all flo the proper enrichment of which appears to be questionable, and withhold certification pending receipt of the Beltsville report. Submit these samples by air mail in grain envelopes containing about 1 ounce of flour. Results of the detailed enrichment tests will be reported by wire usually in from 24 to 48 hours after receipt of samples. Submit to Beltsville by air mail for enrichment tests only those samples that, on applying the quick test, develop a color definitely less than or very much greater than that developed by the standard enriched flour. Do not submit air mail samples of flour certificated as not adequately enriched on the basis of the quick test alone or samples of flour the color of which after treatment with the reagents is only very slightly less intense than that of the standard enriched flour. Slight variations in the color developed by different samples of properly enriched flour may be due to differences in the color of the untreated flour, differences in the degree of packing on the test plate, and to various other causes. The quick test is designed primarily to detect immediately all instances of gross failure to enrich flour properly and to select questionabl samples for prompt precise testing. Minor deviations from the enrichment standards will be detected in the routine testing of supervision samples by the more precise procedures.

Attachment

Lawrence Zeleny